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THE DECISION OF INVESTING IN INFORMATION AND COMMUNICATION TECHNOLOGY IN SMALL AND MEDIUM ENTERPRISES

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Abstract
A diagnostic tool on the decision of investing in Information and Communication Technology (ICT) in small and medium enterprises (SME) suggested in Judith Redoli et al. (2008), showed its usefulness helping to understand how an enterprise uses ICT and ''how'' and ''when'' a company should incorporate new technological elements. The model was applied successfully in the assessment of 500 SME; as a result a technology deployment project was given to each enterprise in which a priority project was also defined. This short paper presents the second part of that study: a second assessment was made to those SME oriented to detect whether the enterprises on which the analysis was conducted did achieve the deployment of the technologies identified within six months, and the relationship between this fact and the existence of an associated grant. On the other hand, in this research the correlation between the priority project established in the first assessment and the one that was finally completed was demonstrated.

Key words: *Innovation; Information and communication technologies (ICT); Information systems; Small and medium enterprises (SME); Telecommunication.*

JEL Classification: *M15*

I. INTRODUCTION

This article is the result of the evolution of the model published, by the same authors (Judith Redoli et al., 2008). The article has been cited in eight articles from the Web of Knowledge database so far.

That article defines a technology diagnostic tool for the incorporation of ICT in companies, allowing a correct planning of the ICT incorporation in the SME. Through this tool, it was possible to contextualise the situation of a SME regard to ICT incorporation, and prioritize the recommended deployments and projects.

In the research framework, and as a follow-up to the work already carried out, it was necessary to test the usefulness and validity of the model as the foundation of a correct ITC definition to be incorporated by every company. For all of this, next step of the research process was addressed, in which, after a year from the application of the defined model, an assessment was made of whether the company did or did not execute the IT incorporation project which were identified and prioritised by the analysis and the correspondence or not between these projects and the ones actually executed.

Then, once the needed time to the research was passed, the collection and analysis of the obtained data took place, with the goal of achieving decisive conclusions.

The aforementioned research was produced in a Spanish region, Castilla y Leon, through a telephone survey aided by fax and e-mail. The selected sample consisted of the companies previously analysed during the 2007-2008 period. In this unit, a comprehensive sampling was applied on the participating companies, achieving finally a sample size of 52 surveys on 200 companies analysed. The associated margin of error is +-0.11 for the global data, with a confidence level of 95% in the sample normal conditions (σ=2, p=q=0.5). The fieldwork was conducted during October 2009 and the exploitation of the results took place during 2010. In this period, the contact with the companies was achieved through their IT manager or responsible.

The variables used in the analysis are listed in Table 1. It is important to highlight that the profile of the object company of the analysis of the impact of the application of our diagnostic tool is that of a small company with less than 50 wage earners and that mainly owns less than 50 computers.

Table 1: Variables used in the analysis

NAME	DESCRIPTION	CATEGORISATION
rojects	Indicates a project achievement or a technological deployment.	Yes No
. of projects	Indicates the number of projects or technological deployment achieved.	Open question
ubsidised	Indicates whether the project was subsidised.	Yes No
Prioritised Project	Indicate the type of project or deployment that was prioritised in the previous technological analysis.	Software acquisition Web Page ERP CRM Mobility solution Client management solution Tracking solution Store management solution Business Intelligence system Registration in specialised search engines Registration in sector marketplaces Unintegrated Business applications Intranet
Real project established	Indicate the project/deployment that finally was executed.	Software acquisition Web Page ERP CRM Mobility solution Client management solution Tracking solution Store management solution Business Intelligence system Registration in specialised search engines Registration in sector marketplaces Unintegrated Business applications Intranet
Total Software	Indicate the investment in Software.	Open question
Hardware total	Indicate the investment in Hardware.	Open question
Consultancy total	Indicate the investment in Consultancy.	Open question
easons	Indicate the reasons why technological deployment was not carry out.	Economic reasons They do not appreciate the benefits of technology Lack of time Other reasons
Level of importance	Indicate the level of importance of the criteria and reasons that motivate the company to start a new project or deployment [Importance assigned to different criteria of technology adoption].	Not important Not very important Neutral Important Very important
Level of achievement	Indicate the level of criteria achievement and reasons that motivate the company to start a new project or deployment [Level of achievement assigned to different technology adoption criteria].	Not completed Partially completed Completed

II. DISCUSSION

Firstly, it has been analysed the existence and meaning of the influence exercised by the application of our diagnostic tool accompanied by the corresponding funding on the technological project-deployment achievement and the number of ICT projects deployments accomplished. The conclusion is that funding encourages the project implementation. The funding factor is an accelerator without a cause and effect connection.

Secondly, in order to verify the effectiveness and the efficacy of the diagnostic tool previously applied to companies, it was necessary to determine if there was a connection between the prioritised project through the diagnostic tool and the project that was finally implemented. The technological solution that the companies analysed implanted the most is the ERP, followed by an Intranet and a Web Page, while the most diagnosed technological solution was ERP, followed by software acquisition, unintegrated business applications, and systems of project management. There is not a significant difference between the prioritised project and the actual one. Therefore, generally, it is possible to state that the diagnostics implementation was correct. The diagnosed companies let themselves to be guided to a greater or lesser extent, choosing the technological

solutions suggested through the diagnostic, object of the research.

Thirdly, by companies that implemented at least one project, another part of the survey analysed the amounts actually invested, and to what they corresponded: software, hardware or consultancy. The average investment of companies to which the diagnostic tool was applied was the following: 12,538 € on software, 13,881 € on hardware and 13,592 € on consultancy.

Fourthly, whereas 65.4% of the analysed companies introduced some technological implementation after the diagnostic tool application, 34.6% did not. The reasons given are mainly connected to do not appreciate the benefits of technology (41.7%). These companies do not know or consider that technology may yield them profits or competitive improvements that would compensate the economic investment and the training that they would need to use. On the other hand, probably considering the context of crisis, economic reasons are a significant obstacle to consider new technology acquisition as well (33.3%), as is lack of time (in a lesser extent with 8.3%), among other reasons. To create a more efficient impulse to adopt technology by the SME, it will be convenient to make the ICT effects tangible, so that it is possible to perceive in a more direct and measurable way the economic and competitive profits they can yield.

Fifthly, the most important criteria about the adoption of technology for the analysed companies (qualified as important or very important) are: implementation cost, product quality improvement, ease of use, and cost cutting. This conclusion offers an important guide to communicate the benefits that companies are going to gain with the new implementation. It is necessary to stress on this valued criteria so that companies will have more positive view on technology and greater tendency to carry out new implementations. The results of this point are shown in Table 2.

Table 2: The most important criteria about the adoption of technology

Criteria	It is important or very important	Perception about satisfaction after implantation
Product Quality Improvement	92.3%	100%
Implementation Cost	86.2%	92.0%
Ease of Use	84.6%	86.4%
Cost Cutting	84.0%	85.7%
Client Satisfaction Improvement	76.9%	95.0%
Implementation Time	75.9%	86.4%
Easiness Implementation	72.0%	100%
Return on Investment	63.6%	57.1%
Differentiation	61.9%	92.0%
Valued Publicity	30.0%	83.3%

III. CONCLUSIONS

The research we have presented throughout this article, certainly validates the tool object of the process of research referenced in Judith Redoli et al. (2008), demonstrating the existence of a positive correlation between the technological solution identified by the application of our diagnostic tool and the one actually implemented, especially in those ICT solutions that have the goal of improving the company internal process.

Once we have identified the solution to be adopted, the accelerators of the ICT incorporation decision by the SME were analysed. Thus, the public funding for the implementation of the identified technological solution becomes an accelerator of the implementation, and not a critical element. These results provide us the following recommendation for policy makers: establish supports from Public Administration first in the implementation of diagnostic tools like the one developed by the authors of this research, and only then support the technological solutions coming from the tool, if this is the case.

Another important point of our analysis is the determination of whether the implementation of a technological solution depended or not from the support of a consultant to the company. Our research concludes that the majority of the companies within the ones to which the diagnostic tool was applied, that carried out a technological implementation, had the support of a consultant. This fact was motivated mainly with the degree of complexity of the implementation.

IV. REFERENCES

1. Redoli, J., Mompo R., García-Díez J., López-Coronado M. (2008) A model for the assessment and development of Internet-based information and communication services in small and medium enterprises, TECHNOVATION, 25 (7), pp. 424-435.